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A black and white photograph of a guitar bridge. Six red bridge pins are visible, arranged in a horizontal row. White guitar strings are threaded through the pins and extend upwards towards the top of the frame. The background is blurred, showing the body of the guitar.

Beginning ASP.NET

for Visual Studio® 2015

William Penberthy

BEGINNING

ASP.NET FOR VISUAL STUDIO® 2015

INTRODUCTION	xxi
CHAPTER 1 Getting Started with ASP.NET 6.0	1
CHAPTER 2 Building an Initial ASP.NET Application	27
CHAPTER 3 Designing Your Web Pages	51
CHAPTER 4 Programming in C# and VB.NET	87
CHAPTER 5 ASP.NET Web Form Server Controls	129
CHAPTER 6 ASP.NET MVC Helpers and Extensions	161
CHAPTER 7 Creating Consistent-Looking Websites	197
CHAPTER 8 Navigation	229
CHAPTER 9 Displaying and Updating Data	267
CHAPTER 10 Working with Data—Advanced Topics	323
CHAPTER 11 User Controls and Partial Views	367
CHAPTER 12 Validating User Input	413
CHAPTER 13 ASP.NET AJAX	449
CHAPTER 14 jQuery	499
CHAPTER 15 Security in Your ASP.NET Website	541
CHAPTER 16 Personalizing Websites	581
CHAPTER 17 Exception Handling, Debugging, and Tracing	605
CHAPTER 18 Working with Source Control	661
CHAPTER 19 Deploying Your Website	683
APPENDIX Answers to Exercises	725
INDEX	735

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KUDOS TO YOU, THE READER, for deciding to learn something new. As you work on software development you will find that you are learning something new almost every day; that is the nature of the beast and one of the things that make it such a rewarding practice.

Combining both MVC and Web Forms into a single project is simple: That's one of the features of the new Visual Studio. However, combining them both into a single beginning book proved to be difficult; giving enough information about each in a logical fashion meant that both approaches to ASP.NET, MVC and Web Forms, were not completely covered. While not completely covered, I think they have been covered in enough depth so that you can take the next step and go deeper into one or both of these technical approaches as you may deem necessary.

I would also like to take this time to thank Ami Frank Sullivan and Luann Rouff who had the unenviable job of helping turn my tortured prose into something that makes sense; I have never seen so many polite ways of saying "This is gibberish!" Many thanks also to David Luke, the technical reviewer, who spent a lot of effort to validate the various steps and code snippets and keep me on the straight and narrow.

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CONTENTS

<i>INTRODUCTION</i>	<i>xxi</i>
CHAPTER 1: GETTING STARTED WITH ASP.NET 6.0	1
<hr/>	
An Introduction to ASP.NET vNext	2
Hypertext Transfer Protocol (HTTP)	2
Microsoft Internet Information Services	5
HTML 5	5
HTML Markup	5
Attributes in HTML	7
HTML Example	8
ASP.NET Web Forms	10
ViewState	10
ASP.NET Web Forms Events and Page Lifecycle	11
Control Library	13
ASP.NET MVC	15
Testability	16
Full Control over Output	17
Web Forms and MVC Similarities	17
Choosing the Best Approach	17
Using Visual Studio 2015	18
Versions	18
Downloading and Installing	19
The Sample Application	23
Summary	24
CHAPTER 2: BUILDING AN INITIAL ASP.NET APPLICATION	27
<hr/>	
Creating Websites with Visual Studio 2015	28
Available Project Types	28
Web Site Project–Based Approach	28
Web Application Project	29
Creating a New Site	30
While Creating a Project	30
Empty Template	34
Web Forms Template	35
MVC Template	36
Web API Template	36

Single Page Application Template	37
Azure Mobile Service Template	38
Working with Files in Your Application	38
File Types of an ASP.NET MVC Application	38
File System Structure of an ASP.NET MVC Application	41
File Types of an ASP.NET Web Forms Application	43
MVC and Web Form File Differences	46
Creating the Sample Application	47
Summary	49
CHAPTER 3: DESIGNING YOUR WEB PAGES	51
HTML and CSS	52
Why Use Both HTML and CSS?	52
An Introduction to CSS	54
More CSS	58
Selectors	58
Properties	61
Precedence in Styles	65
The Style Sheet	67
Adding CSS to Your Pages	68
Creating Embedded and Inline Style Sheets	71
Applying Styles	72
Managing Styles	78
Summary	84
CHAPTER 4: PROGRAMMING IN C# AND VB.NET	87
Introduction to Programming	87
Data Types and Variables	88
Defining a Variable	88
Operators	91
Converting and Casting Data Types	93
Converting Data Types	93
Casting Data Types	96
Using Arrays and Collections	97
Using Arrays	97
Using Collections	99
Decision-Making Operations	101
Comparison Operators	102
Logical Operators	103
If Statement	104
Switch/Select Case Statement	106

Loops	106
For Loop	106
Foreach/For Each Loops	108
While Loop	109
Exiting Loops	110
Organizing Code	110
Methods: Functions and Subroutines	110
Writing Comments and Documentation	112
Object-Oriented Programming Basics	114
Important OO Terminology	115
Classes	115
Fields	116
Properties	117
Methods	120
Constructors	120
Inheritance	121
Events	123
Summary	125
CHAPTER 5: ASP.NET WEB FORM SERVER CONTROLS	129
<hr/>	
Introduction to Server Controls	129
Defining Controls in Your Pages	130
Types of Controls	137
Standard Controls	138
HTML Controls	143
Data Controls	144
Validation Controls	144
Navigation Controls	145
Login Controls	145
AJAX Extensions	146
Other Control Sets	146
The ASP.NET State Engine	147
How the State Engine Works	148
Summary	157
CHAPTER 6: ASP.NET MVC HELPERS AND EXTENSIONS	161
<hr/>	
Why MVC Has Fewer Controls Than Web Forms	162
A Different Approach	162
Razor	166
Controller	170
Routing	172

HTTP Verbs and Attributes	174
Form-Building Helpers	175
Form Extensions	175
Editor and EditorFor	177
Model Binding	177
Summary	194
CHAPTER 7: CREATING CONSISTENT-LOOKING WEBSITES	197
Consistent Page Layout with Master Pages	198
Creating and Using Master Pages in ASP.NET Web Forms	198
Creating a Content Page in ASP.NET Web Forms	208
Creating Layouts in ASP.NET MVC	212
Creating a Content View in ASP.NET MVC	215
Using a Centralized Base Page	219
Summary	225
CHAPTER 8: NAVIGATION	229
Different Ways to Move around Your Site	230
Understanding Absolute and Relative URLs	230
Understanding Default Documents	234
Friendly URLs	234
Using the ASP.NET Web Forms Navigation Controls	236
Using the Menu Control	240
Navigating in ASP.NET MVC	248
Routing	248
Default Configuration and Route	249
Creating a Navigational Structure	252
Programmatic Redirection	255
Programmatically Redirecting the Client to a Different Page	255
Server-Side Redirects	258
Practical Tips on Navigation	262
Summary	263
CHAPTER 9: DISPLAYING AND UPDATING DATA	267
Working with SQL Server Express	268
Installation	269
SQL Server Management Studio	276
Connecting in Visual Studio	282
Entity Framework Approach to Data Access	285
Data First	285

Code First	286
Selecting Data from the Database	295
Data Controls in Web Forms	297
Details View	297
Web Form GridView	303
Data Display in MVC	310
List Display in MVC	311
Details Views	314
Summary	318
CHAPTER 10: WORKING WITH DATA—ADVANCED TOPICS	323
<hr/>	
Sorting and Pagination	324
Sorting and Pagination in Web Form Server Controls	324
Sorting and Pagination in MVC Lists	330
Updating and/or Inserting Data	339
A Non-Code First Approach to Database Access	347
Using SQL Queries and Stored Procedures	350
Caching	358
Different Ways to Cache Data in ASP.NET Applications	358
Common Pitfalls with Caching Data	362
Summary	363
CHAPTER 11: USER CONTROLS AND PARTIAL VIEWS	367
<hr/>	
Introduction to User Controls	368
Creating User Controls	369
Adding User Controls	373
Sitewide Registration of a User Control	376
Managing the IDs of Any Controls	379
Adding Logic to Your User Controls	381
Using Partial Views	387
Adding a Partial View	389
Managing the Controller for a Partial View	393
Templates	400
Summary	408
CHAPTER 12: VALIDATING USER INPUT	413
<hr/>	
Gathering Data from the User	414
Validating User Input in Web Forms	415
Understanding Request Validation	424

Validating User Input in MVC	426
Model Attribution	426
Client-Side Validation	434
Request Validation in ASP.NET MVC	443
Validation Tips	444
Summary	445
CHAPTER 13: ASP.NET AJAX	449
Introducing the Concept of AJAX	450
F12 Developer Tools	451
Using ASP.NET AJAX in Web Forms	457
The Initial AJAX Experience	457
Enhancing the AJAX Experience	466
Using AJAX in MVC	469
Using Web Services in AJAX Websites	483
jQuery in AJAX	489
Practical AJAX Tips	495
Summary	496
CHAPTER 14: jQuery	499
An Introduction to jQuery	499
Early JavaScript	500
jQuery's Role	500
Including the jQuery Library	503
Bundles	506
jQuery Syntax	512
jQuery Core	513
Working with the jQuery Utility Methods	514
Selecting Items Using jQuery	516
Modifying the DOM with jQuery	519
Changing Appearance with jQuery	519
Handling Events	523
Debugging jQuery	532
Practical Tips on jQuery	536
Summary	537
CHAPTER 15: SECURITY IN YOUR ASP.NET WEBSITE	541
Introducing Security	542
Identity: Who Are You?	542

Authentication: How Can Users Prove Who They Are?	542
Authorization: What Are You Allowed to Do?	543
Logging in with ASP.NET	543
Configuring Your Web Application for Security	547
Working with Users within Your Application	558
Roles	566
Configuring Your Application to Work with Roles	567
Programmatically Checking Roles	572
Practical Security Tips	576
Summary	576
 CHAPTER 16: PERSONALIZING WEBSITES	 581
<hr/>	
Understanding the Profile	582
Creating the Profile	582
Using the Profile	590
Practical Personalization Tips	602
Summary	603
 CHAPTER 17: EXCEPTION HANDLING, DEBUGGING, AND TRACING	 605
<hr/>	
Error Handling	606
Different Types of Errors	606
Syntax Errors	606
Logic Errors	607
Runtime Errors	609
Catching and Handling Exceptions	612
Global Error Handling and Custom Error Pages	621
Error Handling in a Controller	627
The Basics of Debugging	629
Tools Support for Debugging	629
Moving Around in Debugged Code	629
Debugging Windows	631
Other Windows	634
Debugging Client-Side Script	638
Tracing Your ASP.NET Web Pages	647
Adding Your Own Information to the Trace	650
Tracing and Performance	654
Logging	654
Downloading, Installing, and Configuring a Logger	655
Summary	658

CHAPTER 18: WORKING WITH SOURCE CONTROL	661
Introducing Team Foundation Services	661
Why Use Source Control	662
Setting Up a Visual Studio Online Account	662
Checking Code In and Out	669
Undoing Changes	670
Shelvesets	672
Getting a Specific Version from the Server	672
Seeing Changed Items in Solution Explorer	675
Looking at History and Comparing Versions	675
Labeling	676
Interacting with a Team	677
Changing Default Source Control Behavior in Visual Studio	677
Branching and Merging	678
Summary	681
CHAPTER 19: DEPLOYING YOUR WEBSITE	683
Preparing Your Website for Deployment	684
Avoiding Hard-Coded Settings	684
The Web.config File	685
Expression Syntax	685
The Web Configuration Manager Class	687
Preparing for Deployment	691
Microsoft Azure	691
Publishing Your Site	695
Introducing Web.config Transformations	706
Moving Data to a Remote Server	713
Smoke Testing Your Application	720
Going Forward	722
Summary	722
APPENDIX: ANSWERS TO EXERCISES	725
 INDEX	 735

INTRODUCTION

IT WAS ESTIMATED IN JUNE 2015 that 45 percent of the world’s population has accessed the Internet. That’s over 3 billion users, and the number is growing every day. This is a vast, connected market that can reach any content you decide to make available, be it a simple web page or a complex web application.

There are a lot of ways that you can make a simple web page available online. There are a lot fewer approaches when you are trying to build a web application. One of these web application technologies is ASP.NET from Microsoft.

ASP.NET is a framework that supports the building of robust and performant web applications. Think of it as the structural support for a car. You can add a couple of different body designs on top of this structure: ASP.NET Web Forms and ASP.NET MVC. These two approaches both rest on ASP.NET and depend on common functionality that is made available through ASP.NET.

Visual Studio 2015 is the primary tool used when creating and maintaining ASP.NET web applications. It will help you easily work with every aspect of your web application, from the “look and feel” all the way through to deployment of your application—and skipping none of the steps in between. In addition, because Microsoft is committed to supporting ASP.NET developers, it is available in a fully functional free version!

This book is an exploration of both ASP.NET Web Forms and MVC. As part of this exploration you will become familiar with all of the various components of a functional web application, creating a sample application as you go through the different parts of the development process. You will learn how the two frameworks do things, with some approaches being very similar while others are completely different. No matter the style of approach, however, it is always clear that they both rest on the same framework.

WHO THIS BOOK IS FOR

This book is designed for anyone who wants to build robust, performant, and scalable web applications. Although the development tools run in Microsoft Windows, you are free to deploy the application onto virtually any current operating system; therefore, even organizations that don’t have Microsoft servers have the capability to now run ASP.NET web applications.

If you are new to software development you should have no problem following along, as the book has been structured with you in mind. Those of you who are experienced developers but new to web development will also find many different areas of interest and use, especially if C# is not your current programming language.

Lastly, experienced ASP.NET developers should also find many topics of interest, especially if your experience is mainly related to either Web Forms or MVC, but not both. This book will give you

experience in both approaches as well as demonstrate how to integrate the two approaches into a single application.

WHAT THIS BOOK COVERS

This book teaches you how to build a fully functional web application. You will have the opportunity to build a complete site using both ASP.NET MVC and ASP.NET Web Forms approaches so that you can develop an understanding of, and build a comfort level with, the complete ASP.NET set of functionality. Each chapter takes you a step further along the development process:

- **Chapter 1: Getting Started with ASP.NET 6.0**—You will get an introduction to ASP.NET as a general framework and specifically with Web Forms and MVC. You will also download and install Visual Studio 2015.
- **Chapter 2: Building an Initial ASP.NET Application**—In this chapter you create the initial project, including configuring it to support both Web Forms and MVC.
- **Chapter 3: Designing Your Web Pages**—This chapter introduces you to HTML and CSS so that you can build attractive and understandable web sites.
- **Chapter 4: Programming in C# and VB.NET**—ASP.NET is a developmental framework with which you can use different programming languages, including C# and VB.NET. This chapter provides an introduction to using them.
- **Chapter 5: ASP.NET Web Form Server Controls**—ASP.NET Web Forms offers many different forms of built-in functionality that it provides as server controls. These controls enable you to create complex and feature-rich web sites with very little code. This chapter covers the most common controls.
- **Chapter 6: ASP.NET MVC Helpers and Extensions**—Whereas ASP.NET Web Forms have server controls to provide features, ASP.NET MVC offers a different type of support through the use of helpers and extensions. This chapter describes that different support.
- **Chapter 7: Creating Consistent-Looking Websites**—You will learn how ASP.NET enables you to use master pages and layout pages to create a consistent look and feel throughout your web application.
- **Chapter 8: Navigation**—In this chapter you learn the different ways to create menus and other navigation structures. You also look at the different types of links that you can build in both Web Forms and MVC.
- **Chapter 9: Displaying and Updating Data**—When you want to use a database with ASP.NET, there are no better options than SQL Server. In this chapter, you install SQL Server, create your initial database schema, and incorporate the creation and display of data into your application.
- **Chapter 10: Working with Data—Advanced Topics**—Advanced topics include pagination, sorting, and using advanced database items such as stored procedures to retrieve special sets

of information from the database. You will also learn how you can speed up responsiveness by storing data in various places.

- **Chapter 11: User Controls and Partial Views**—ASP.NET offers server controls and helpers to provide built-in functionality. Learn how to create your own items to provide common functionality across multiple pages.
- **Chapter 12: Validating User Input**—A large part of your site’s functionality is defined by the data that users input into your application. This chapter shows you how to accept, validate, and process user input using tools for both Web Forms and MVC.
- **Chapter 13: ASP.NET AJAX**—AJAX is a technology that enables you to update parts of your page without making a full-page call to the server. Learn how to do this for both Web Forms and MVC.
- **Chapter 14: jQuery**—Everything covered up until this point has been based on doing work on the server. In this chapter you are introduced to using jQuery for work on the client, without having to call back to the server.
- **Chapter 15: Security in Your ASP.NET Website**—This chapter adds the concept of a user, demonstrating how you can identify your visitors by requiring them to log in to your application.
- **Chapter 16: Personalizing Websites**—Here you will learn how to customize the user information you are using to get the information needed to ensure that users feel welcome at your site. Capturing information about the user’s visit also helps you better understand what they want when they visit your site.
- **Chapter 17: Exception Handling, Debugging, and Tracing**—Unfortunately, it’s very difficult to write code that is totally problem-free. Learn how to manage these problems, including finding and fixing them as well as ensuring that when they happen, users are given the relevant information as to why their actions were not successful.
- **Chapter 18: Working with Source Control**—Working within a team is an important aspect of being a professional developer. Source control provides a way for you to share code among users. It also manages backing up your source code with saved versions.
- **Chapter 19: Deploying Your Website**—After completing all the work to build your application, the last step is getting out onto the web where your users can visit it!

HOW THIS BOOK IS STRUCTURED

The primary instructional approach in this book is a set of detailed hands-on steps that walk you through the process of building a complete application. These “Try It Out” activities, which demonstrate whatever topic is under discussion, are followed by a “How It Works” section that explains what each step accomplishes. Each of the “Try It Out” sections builds on what was done previously, so they should be followed sequentially.

Exercise questions at the end of the chapter enable you to test your understanding of the material, and answers are available in the appendix. Some questions are specific, others more general. Together they are designed to help reinforce the information presented in the chapter.

A lot of information is presented in this book; it covers two technological approaches that sometimes seem completely different. Additional sources of information are included in the chapters if you want more detailed information about a particular approach or product.

WHAT YOU NEED TO USE THIS BOOK

In order to follow along with the chapter and its hands-on activities, you will need the following:

- Windows 7, 8, or 10 or Windows Server 2008 or 2012
- The minimum requirements for Visual Studio 2015, including RAM and hard drive space

CONVENTIONS

To help you get the most from the text and keep track of what's happening, we've used a number of conventions throughout the book.

TRY IT OUT

This is a hands-on exercise you should work through, following the text in the book.

1. They consist of a set of steps.
2. Each step has a number.
3. Follow the steps with your copy of the database.

How It Works

This section explains in detail the code from each “Try It Out” activity.

WARNING *Boxes like this one hold important, not-to-be forgotten information that is directly relevant to the surrounding text.*

NOTE *These are tips, hints, tricks, or asides to the current discussion, offset and placed in italics like this.*

As for styles in the text:

- We *highlight* new terms and important words when we introduce them.
- We show keyboard strokes like this: Ctrl+A.
- We show filenames, URLs, and code within the text like so: `persistence.properties`.

We present code in two different ways:

We use a monofont type with no highlighting for most code examples.

We use **bold** to **emphasize** code that's particularly important in the present context.

SOURCE CODE

As you work through the examples in this book, you may choose either to type in all the code manually or to use the source code files that accompany the book. All the source code used in this book is available for download at <http://www.wrox.com/go/beginningaspnetforvisualstudio>. You will find the code snippets from the source code are accompanied by a download icon and note indicating the name of the program so you know it's available for download and can easily locate it in the download file. Once at the site, simply locate the book's title (either by using the Search box or by using one of the title lists) and click the Download Code link on the book's detail page to obtain all the source code for the book.

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ERRATA

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At <http://p2p.wrox.com> you will find a number of different forums that will help you not only as you read this book, but also as you develop your own applications. To join the forums, just follow these steps:

1. Go to p2p.wrox.com and click the Register link.
2. Read the terms of use and click Agree.
3. Complete the required information to join as well as any optional information you wish to provide and click Submit.
4. You will receive an e-mail with information describing how to verify your account and complete the joining process.

NOTE *You can read messages in the forums without joining P2P but in order to post your own messages, you must join.*

Once you join, you can post new messages and respond to messages other users post. You can read messages at any time on the Web. If you would like to have new messages from a particular forum e-mailed to you, click the Subscribe to This Forum icon by the forum name in the forum listing.

For more information about how to use the Wrox P2P, be sure to read the P2P FAQs for answers to questions about how the forum software works as well as many common questions specific to P2P and Wrox books. To read the FAQs, click the FAQ link on any P2P page.

1

Getting Started with ASP.NET 6.0

WHAT YOU WILL LEARN IN THIS CHAPTER:

- A brief history of ASP.NET and why it supports both Web Forms and MVC
- About the two frameworks, Web Forms and MVC
- How to install and use Visual Studio 2015
- The sample application that will be used throughout this book

CODE DOWNLOADS FOR THIS CHAPTER:

The wrox.com code downloads for this chapter are found at www.wrox.com/go/beginningaspnetforvisualstudio on the Download Code tab. The code is in the chapter 01 download and individually named according to the names throughout the chapter.

The Internet has become a critical part of life to millions of people across the world. This growth in the use of the Internet has been accelerating since the 1990s and will continue as technology and access becomes more affordable. The Internet has become the go-to source for shopping, leisure, learning, and communications. It has helped to both build new businesses and give revolutionaries the capability to spread their message to the rest of the world.

This growth means that there will be a long-term demand for people with the skills to build and maintain the next generation of web applications. As an increasing percentage of the world's business is accomplished with web applications, learning how to work on these applications is an obvious career move.

AN INTRODUCTION TO ASP.NET vNEXT

The Internet started off as a set of sealed, private networks designed to share information between research institutions across the United States. The primary users of this system were the research scientists in those labs. However, as the usefulness and flexibility of this information-sharing approach became obvious, interest grew exponentially. More and more institutions became involved, resulting in the evolution of standards and protocols to support the sharing of additional types of information. The initial networks quickly expanded as commercial entities became involved. Soon, Internet service providers were available, enabling regular, everyday people to access and share the burgeoning content of the Internet.

In the early days of the Internet, most content was created and stored statically. Each HTTP request would be for a specific page or piece of stored content, and the response would simply provide that content. Early application frameworks changed that model, enabling the dynamic generation of content based on a certain set of criteria sent as part of that request. This enabled content to be built from databases and other sources, exponentially increasing the usefulness of the Web. It was at this point that the general public, rather than only scientists, really started to take advantage of the Internet's enhanced usability.

ASP.NET is one of those early web application frameworks, with the first version of the .NET Framework released in 2002. The ASP part of the name stands for "Active Server Pages," which was Microsoft's initial web application framework that used server-side processing to create browser-readable HTML pages. The original ASP, now called "Classic ASP," allowed the developer to use VBScript to add scripting code to HTML. However, the code and the HTML were all intermingled together in a single file.

ASP.NET was considered a major enhancement at the time because it allowed for a much cleaner separation of the code-behind, the code that handles the processing and markup, the code handling the building of the display, than any of the other frameworks available at that time. There have been improvements to this initial ASP.NET framework with every new release of the .NET Framework.

In 2008 Microsoft introduced a new framework that supported a different approach to content creation and navigation: ASP.NET MVC. MVC stands for Model View Controller, and references a software design pattern that provides a more complete separation between the user interface and the processing code. The original framework became known as Web Forms. Even as the Internet content-creation technologies evolve, the way that the Internet runs stays surprisingly unchanged. The movement of the information from the server to the client follows a very simple protocol that has barely changed since the beginning of the Internet.

Hypertext Transfer Protocol (HTTP)

Hypertext Transfer Protocol (HTTP) is the application protocol that acts as the foundation for communications within the Internet. It defines the interaction between the client machine and the server as following a request-response model whereby the client machine requests, or asks for, a specific resource and the server responds with, or sends a reply about, the information as appropriate.

This request can be very simple, from "show me this picture," to something very complex, such as a transfer between your bank accounts. Figure 1-1 shows the outcome of that request—whether it is